<table>
<thead>
<tr>
<th>Grade Level &amp; Course</th>
<th>6th Grade World History</th>
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</thead>
<tbody>
<tr>
<td>Unit Title</td>
<td>Uncovering the Past</td>
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<tr>
<td>Lesson Title</td>
<td>Making and Coding: The Chariot Challenge</td>
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<tr>
<td>Expected Lesson Length</td>
<td>6 class periods (45 min each)</td>
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### Objectives
- I can explain how chariots were made in ancient times
- I can explain why chariots were used in ancient times
- I can design a modern-day chariot (**A.1.3 - Creativity**)
- I can code my modern-day chariot to navigate autonomously (**A.1.7 - Digital Literacy & Computer Science**)
- I can work with my teammates (**A.1.5 - Collaboration**) to solve problems (**A.1.2 - Problem Solving**) that relate to: big/small interpersonal, design, time-management, etc. issues
- I can consider multiple design prototypes to help my team design a chariot that can navigate the track (**A.1.1 - Critical Thinking**)
- I can analyze data to inform my chariot design process (**A.1.6 - Data Literacy**)
- I can use Claims, Evidence, and Reasoning to explain my design prototype to my team, teacher, and class (**A.1.4 - Communication**)

### Materials Needed
- 1 **Sphero** per group of 4 students
- Sphero coding software downloaded onto computer/Chromebook/iPad
- Plenty of building materials (K’nex, pipe cleaners, popsicle sticks, CDs, etc.)
- **Chariot Prototype Design Sheets** (at least 2 per student)

### Day 1

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| 1    | ~15 min       | 1. Quick Class Discussion: In ancient times, people used something called a “chariot” (a cart, usually pulled by horses) to haul materials, build things or even race against each other.  
2. Show **Ancient Egyptian Chariots** (6:07min) to the class  
3. Have Students draw a sketch of what a horse-drawn chariot looks like. Be as detailed as possible, but draw based on what you already know. Don’t look online (yet!)  
4. Your challenge is to design and build a Sphero chariot. Watch the video below for a quick glimpse into what you will be doing.  
5. Show class the **Engineering Design Process**: Review the Engineering Design Process image. Refer back to it throughout to better focus your efforts during the process. |
| 2    | ~20 min       | 1. Research chariots online. Find photos and videos, noting their design and function. Consider these questions: |

Adapted from: [https://edu.sphero.com/cwists/preview/63x](https://edu.sphero.com/cwists/preview/63x)
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| 3    | ~10 min       | 1. Examine the chariot construction materials you have to build with. Brainstorm some possible designs by experimenting with the materials.  
2. Show [Chariot STEM Challenge Design and Code](https://edu.sphero.com/cwists/preview/63x) video  
3. Quick Draw: How might Sphero be used to pull a chariot?  
   ○ Will you use wheels?  
   ○ What kind and size?  
   ○ What will you use for an axle?  
   ○ Which chariot design might work best? Why?  
   ○ Select your favorite idea to share with your team. |
## Day 4

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| 1    | ~45 min       | 1. Code a program in Sphero or Scratch, using the Draw or Blocks canvas, that enables Sphero to complete the course autonomously; in other words, on its own. This program can be used as an opponent during the upcoming chariot race.  
2. At this point, you should take some time to practice driving your chariot around the track. Keep in mind that faster isn't always better when it comes to Sphero and chariots. Why might that be?  
3. Observe how your chariot and Sphero move. Is there anything you can adjust or change to make it better?  
4. Work together to troubleshoot any issues that arise.  
   ○ Some teammates may need to focus on re-design of the chariot while others focus on the code  
   ○ Make sure everyone gets a chance to code and make |

## Day 5

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| 1    | ~45 min       | 1. How can we make the Sphero Chariots faster? Let's gather data, evaluate the results, and make some predictions.  
   ○ Time the Sphero Chariots around the track.  
   ○ Compile best times in a spreadsheet.  
   ○ Evaluate each chariot by listing the materials and weighing it with and without Sphero.  
   ○ Discuss what made that chariot faster or slower than the others.  
2. Using this data, go back and make modifications to your chariot. Sometimes weight reduction helps. Other times shifting the balance of weight can help as well. Discuss the changes with a peer.  
3. Once your updated chariot is ready, race again to see if the changes made any difference. |

## Day 6

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| 1    | ~15 min       | 1. Last-minute adjustments to your code or chariot  
2    | ~30 min       | 1. Race your Chariot with other teams! |